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AUTHOR Ogletree, Earl J.; Haskins, Therese C.
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ABSTRACT

A literature review of studies on educational computer applications and use revealed that U.S. school districts have incorporated microcomputers into both their instructional and administrative processes. Apple and Radio Shack's TRS-80 microcomputers are the two most popular microcomputers used. Mathematics and language usage are most often reported as the main instructional areas assisted by microcomputers at the elementary level, with computer literacy and programming the major use at the secondary level. Inadequate teacher training remains the consistent primary concern of school districts that use computers for instruction. Availability of quality software was also consistently reported as necessary for successful microcomputer use. Finally, the establishment of a regional clearinghouse or statewide consortia was suggested by several studies to assist school districts in seeking successful, microcomputer-assisted educational programs. The data suggest that the use of microcomputers in education must be compatible with instructional objectives of the school district, but that students must also be prepared to cope with the scientific and technological changes affecting society and the schools. Administrators need to take steps to meet these goals. Ten references are listed. (LMM)

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MICROCOMPUTER USE IN THE SCHOOLS: A RESEARCH REVIEW

by

Earl J. Ogletree
and
Therese C. Haskins

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The increasing presence of microcomputers in schools seems to be generating a new energy and motivation for students, teachers and administrators alike. Considering that microcomputers have only been available for purchase by the schools since 1977, it is surprising how rapidly they have been integrated into many facets of educational use.

For the administrator, as an efficient secretarial aid and tool for manipulating data, microcomputers can be a cost-effective solution to many of the day to day management functions of a school or school district. Readily available microcomputer software provides valuable time-saving applications to assist with scheduling, accounting and a variety of other tasks which would require considerably more time and manpower if a microcomputer were not available.

Using microcomputers means increased efficiency in managing instruction for the classroom teacher. More quickly than ever before, teachers can choose individual remedial instruction as well as enrichment programs. Tutor mode CAI can provide an individualization of instruction that cannot be matched by a teacher who must deal with large number of students. In addition, teachers have more time to personalize learning if computers take over time-consuming paperwork that accompanies the management of instruction.

The microcomputer is the first technology that offers true interaction with the learner. It can present problems and activities to the learner, and on the basis of his responses, vary subsequent problems and activities. It can evaluate a student's progress and modify the pace, difficulty or nature of the instruction. The microcomputer can be personally useful to students as

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an aid to problem solving as well as an object of learning in itself through the discipline of computer science. These students will need to prepare for the jobs of the future, a great number of which will ba available in the computer field.

On the other hand, some educators question whether learning to program sharpens the mind to any greater degree than the traditional, low-technology disciplines of learning to debate, to prove geometry theorems or to write in a foreign language. Also, job prospects in computing may not be as bright as they seem because although there is a severe shortage of experienced programmers, there is a glut of beginners. One major source of computer industry employment, data entry, is drying up as machines that can read and listen take over jobs once held by clerks. On the other hand, the Bureau of Labor Statistics predicts that 685,000 jobs in the computer field will be available by 1990. Education is rapidly emerging as a primary user of the multi-application services provided by microcomputers.

School districts have purchased a variety of microcomputer equipment and software but there is evidence that many schools do not have enough trained personnel to properly use and apply the new technology in the educational setting. How are the educators using and applying microcomputers? And what are some of the related problems?

Related Studies

A survey study by Goor (1980) revealed that approximately one-half of the nation's school districts provided computer based education and 87 percent of these 7,606 districts had microcomputers. On average, the districts with computers had one for every 560 students. They used computers for a number of instructional purposes. The most frequent used was computer literacy, followed by enrichment in specific subjects areas, motivation of high achievers, and remedial instruction in secondary schools. Foremost among the needs for expanded application of computers were teacher preparation and quality computer software for instructional

purposes. Numerous districts indicated that the lack of funds limited the start or expansion of computer-based-instruction. Many districts were already taking steps to address these needs by implementing inservice teacher-training programs and designating groups to select existing software products. The findings in this 1980 report reflected an early stage in the utilization of computers in education.

Tinker and Naiman, (1980) studied the role of microcomputers in six New England states and New York State and found the three most popular microcomputers being used were the Commodore Pet, Radio Shack's TRS-80 and Apple II. They investigated the availability of software and in addition to listing several exemplary software, this report evaluated the methods of software selection--writing software from scratch, the modification of software, sharing software, and purchasing nationally distributed software. The software was selected based on educational value and supplier reputation.

Tinker and Naiman also documented examples of school applications and the role of microprocessors within the seven participating states and identified ten locations nationally where schools have successfully integrated the use of personal computers in the K-12 curriculum. The most notable was the Minnesota Educational Computing Consortium, nationally known as the only statewide computer education agency.

The study described policies and program procedures used by states to control or assist in the purchase of hardware. The authors concluded that legislators reject any semblance of a national curriculum or mandated educational program policy on the federal as well as the state level. The persistent problem of inequity between inner cities and affluent suburbs, or suburbs and rural districts cannot be resolved until federal agencies support computer education.

Stutzman (1981) investigated the use of computers in California elementary and secondary schools. He reported that over one-third of the districts in California use computers for instruction. Hands on experience in 82 percent of the districts

was limited to less than 25 percent of the students. The instructional areas that received the greatest emphasis were mathematics, computer literacy, science, business education, and career guidance. In elementary districts, language development and gifted programs received significant computer support. Instructional methods included problem solving, basic skills and enrichment. BASIC was the most frequently used computer language.

It was also found that over 60 percent of the teachers using computers were either unprepared or inadequately prepared to function in a computer supported environment. One-third of the districts not using computers were planning to initiate a program the following year or soon after. Stutzman concluded that there is a growing need for teacher preparation in computer assisted instruction. He recommended that a minimum competency in the theory and use of computers in instruction should be required for teachers and administrators.

The results of a survey by the Oklahoma State Department of Education (1982) found that Radio Shack computers were used by the majority of Oklahoma schools. The school districts had 697 TRS-80's, 173 Apples, and 67 Commodore Pet computers. The computers were primarily used in the math and business departments. The Oklahoma schools needed more hardware, better software, and additional teacher training. The need for additional peripherals and a clearinghouse for information were also reported. Their major concern was the lack of teacher knowledge and training in microcomputer competency and application.

As a result of the survey, the Oklahoma State Department State Department of Education has established a new department to provide support and leadership in CAI to Oklahoma schools, a special microcomputer technology center as a clearinghouse and site for statewide workshops, and has published microcomputer curriculum guides.

In a study conducted by the Center for Social Organization of Schools of Johns Hopkins University (Becker, 1982), survey data were gathered from approximately 1200 public, private and parochial elementary and secondary schools. The data showed

that microcomputers were used to improve basic academic skills. At the secondary school level, computers were used to teach computer awareness, literacy and BASIC programming. Teachers viewed microcomputers primarily as a tool to help them teach basic skills or as a resource for students to learn more about computers. The data indicated that the longer schools have microcomputers the less they use the for drill and practice and the more they employ them to teach computer literacy and programming. The respondents noted that the quality of software has improved over the past years. Many teachers responding to this survey found that the positive effects of microcomputers have been social rather than academic. Students are more enthused about learning, working independently and helping fellow students.

The COSC study also analyzed the use of microcomputers according to SES and ethnicity. The minority elementary schools used intensive drill and practice activities for below-average students, whereas low SES white elementary schools more often taught programming to above-average students.

The results of a nationwide survey conducted by the Educational Research Service (Protheroe, 1982) showed that computers were used in 92 percent of the 1,484 school districts reporting. Eighty-nine percent reported using computer technology for administrative purposes, 77 percent for instructional purposes, and 75 percent used them for administrative and instructional functions. A majority of these districts reported that 50 percent or more of the total computer time available in their districts was allocated to administrative rather than instructional functions.

The majority of districts included computer literacy in the curriculum, followed by CAI, and computer managed instruction (CMI). Fewer districts reported using computers for student non-academic records, such as generation of vocational counseling information, filing of health records and maintenance of psychological test results.

Microcomputers appeared to be a new partner in teacher education according to a national study of microcomputer usage. Judd and Dierterle (1983) surveyed 730 institutions listed by the American

Association of Colleges for Teacher Education. They received replies from 58 percent of these institutions. Forty-two percent of the respondents stated they offered microcomputer familiarization courses for preservice teachers and 56 percent provided these courses for inservice teachers. According to the survey, the most frequently used microcomputers in teacher education were the Apple, TRS-80 and the Commodore, respectively. They used the microcomputers for instructional assistance, research and development and wordprocessing. Finally, more than 85 percent of the respondents felt the need for a state or regional clearinghouse for the development of educational programs.

Summary

A review of literature revealed that school districts across the nation have incorporated microcomputers into their instructional as well as administrative process. Apple and Radio Shack's TRS-80 microcomputers are the two most popular microcomputers used in the country. Mathematics and language usage are most often reported as the main instructional areas assisted by microcomputers at the elementary school level, whereas computer literacy and programming are most often the main curricular use of microcomputers at the secondary school level. Inadequate teacher training remains the consistent primary concern of school districts that use computers for instruction. In addition, the availability of quality software was consistently reported as necessary for successful use of microcomputers in education. Finally, the institution of a regional clearinghouse or statewide consortia was suggested by several studies as a possible solution to the problems of school districts seeking successful microcomputer assisted educational programs.

The data suggest that the use of microcomputers in education must be compatible with instructional objectives of the school district. On the other hand, students need to be prepared to cope with the many changes in science and technology that impact society and the schools. To accomplish these goals, administrators need to:

1. Provide time and encouragement for inservice training of staff and/or teachers in the use and application of microcomputers in education.

2. Explore all funding sources to purchase additional microcomputer hardware and software.

3. Provide time for careful review of software in order to purchase quality programs that can be integrated with bona fide instructional objectives.

4. Take advantage of services provided by regional consortia, universities and private firms in terms of inservice training, software review and software price reductions.

5. Exert political influence on state boards of education and agencies to provide assistance in microcomputer curriculum development, acquisition, and funding.

The information explosion and ready access to the influence of computers in society pose many challenges and problems to the traditional practices in education. For administrators and teachers, it means that they must be open to the educative potential of microcomputers and the electronic age. It is an opportunity for educators to be on the leading rather than the the trailing edge of change.

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